Aeromedical Lessons Learned from the Space Shuttle Columbia Accident Investigation

Update 2011

Introduction

- Today our panel will provide you with an update on the Columbia accident response presented in 2005 with additional information that was not available at that time.
- Some of you may already know some of the details, but others may not.
- I will provide an introduction and my colleagues will provide information on the following topics:

Introduction Continued

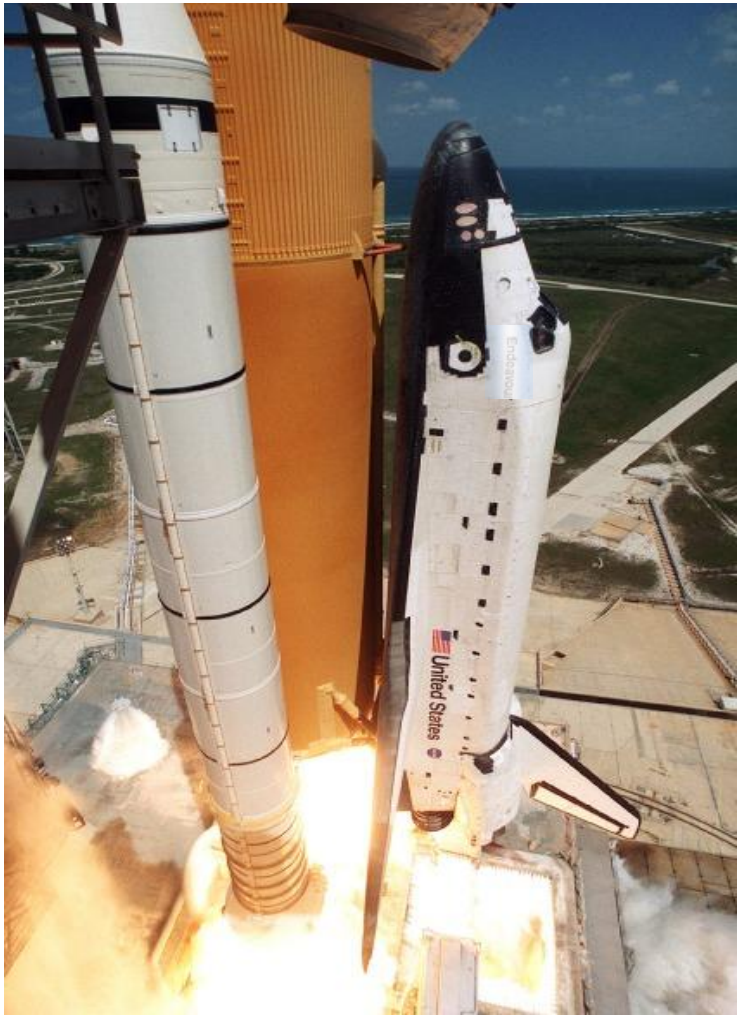
- Dr. Stepaniak, the Lead Shuttle Crew Surgeon at JSC, has worked 28 STS missions and was the Medical Mishap Investigation Team (MIT) Lead for STS-107. He will provide an overview of the medical response and Search & Rescue.
- Ms. Shafer, Deputy Chief Counsel at JSC, who provided legal support to the Columbia Task Force, will provide medico-legal issues associated with the accident.
- Dr. Packham, Associate Director of Safety and Mission Assurance and Deputy Manager Flight Safety Office at JSC will provide information on the Spacecraft Crew Survival Integrated Investigation Team Report published in 2008.
- Mr. Patlach, a member of the JSC Space Medicine Division Contingency Team who supported the MIT from the Disaster Field Office, will provide information on future NASA flight surgeon spacecraft accident response training.

STS– 107 CREW

David Brown **Laurel Clark** **Michael Anderson** **Ilan Ramon**

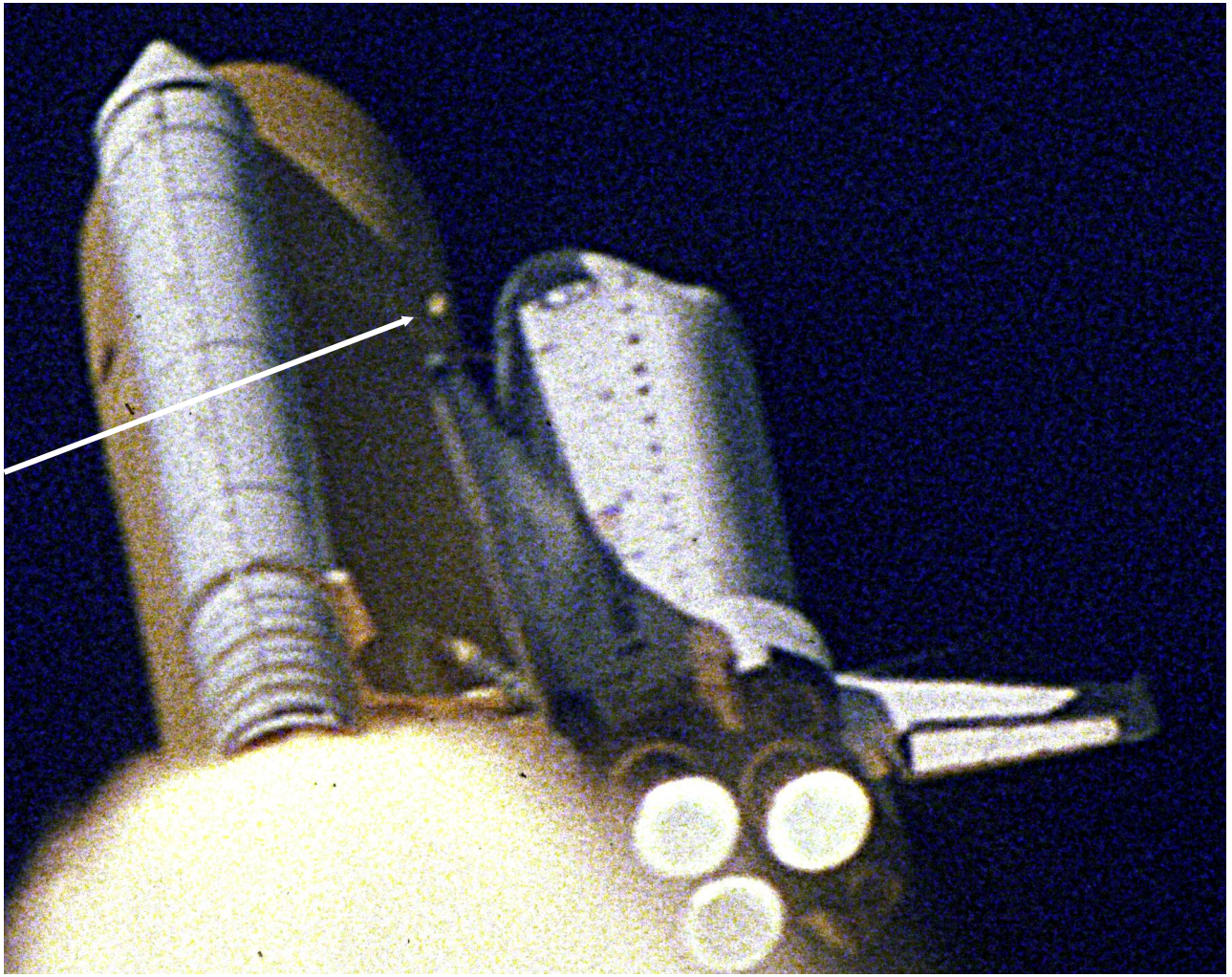
Rick Husband **Kalpana Chawla** **William McCool**

Launch January 16, 2003



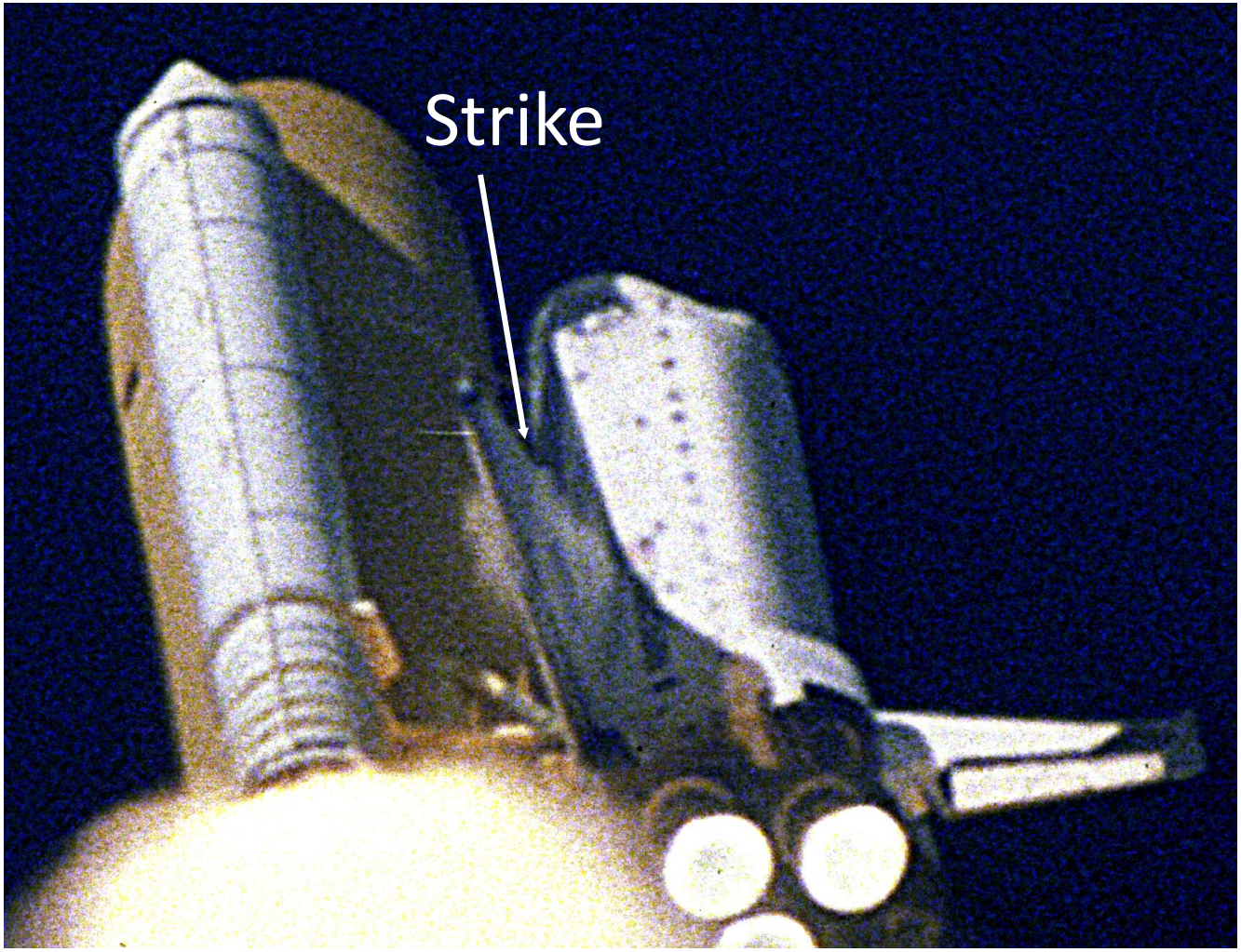
Columbia Launch Foam Separation

- High Contrast: good size comparison
- Early in fall (81.7 sec); little motion blur acquired
- Known size: ~24” x 15”
- 1.67 Pounds

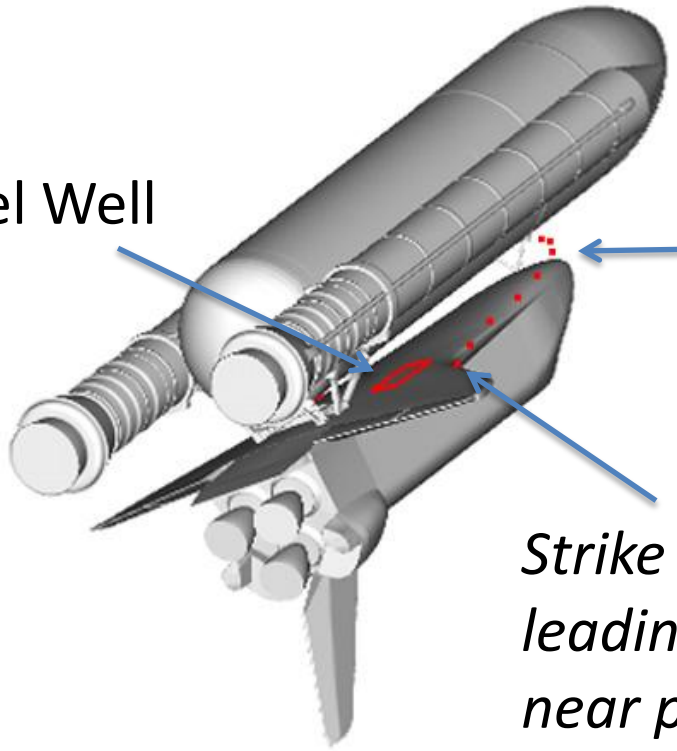


The Orbiter “Ran Into” the Foam

- Foam Speed 1,105 MPH
- Orbiter Mach 2.46 (1650 MPH)
- Relative Velocity 545 MPH (like dropping a 16# bowling ball from 2nd floor)
- 81.9 seconds after launch
- Altitude 65,820 feet



Simulation based on AutoCad Overlay



Launch

FOAM TEST

Conducted at Southwest Research Institute
San Antonio, Texas

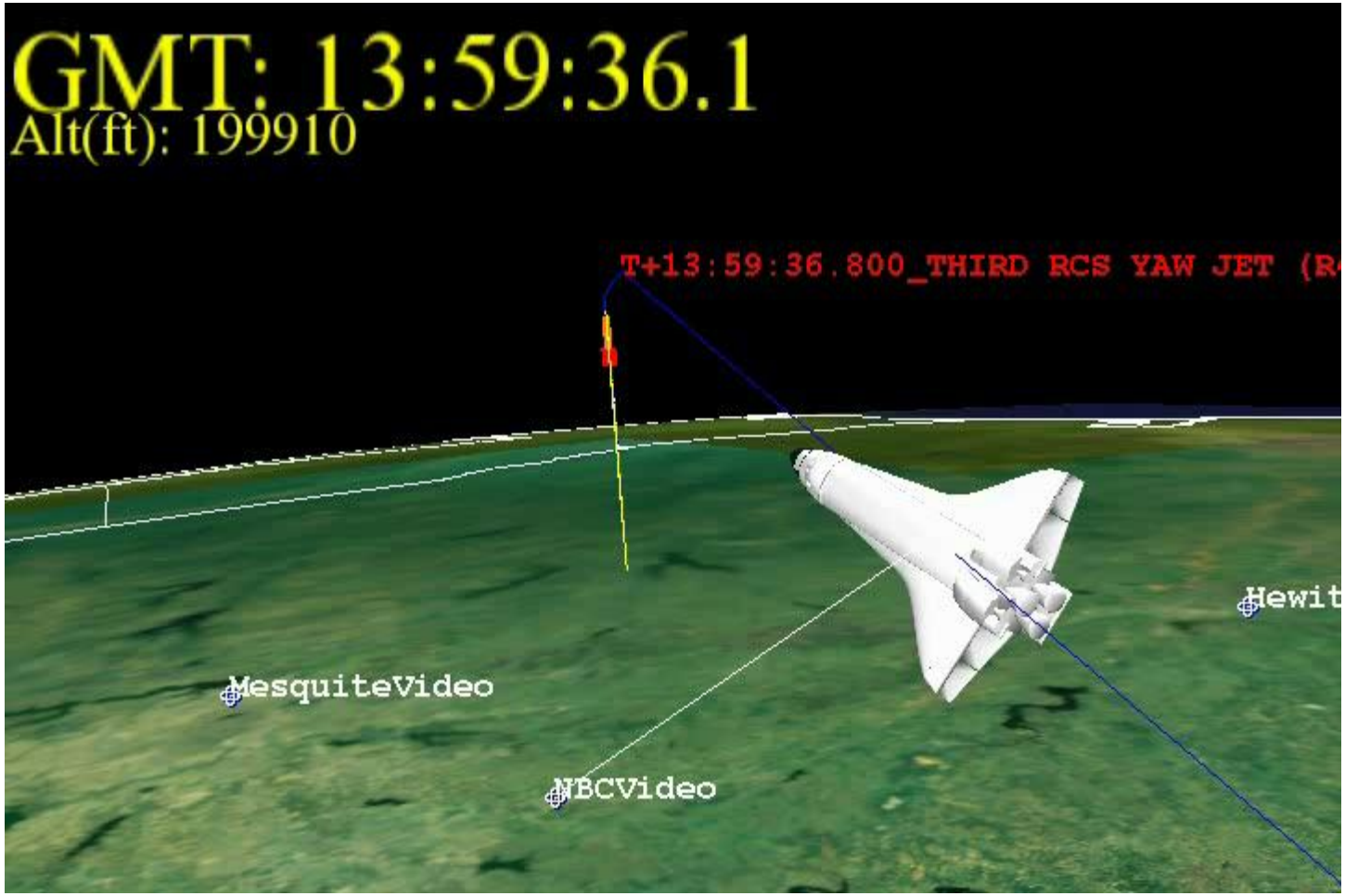
1.67 lb foam test projectile impacted the panel at 777 ft/sec which created a hole 16 in. x 17in.

STS 107 Entry

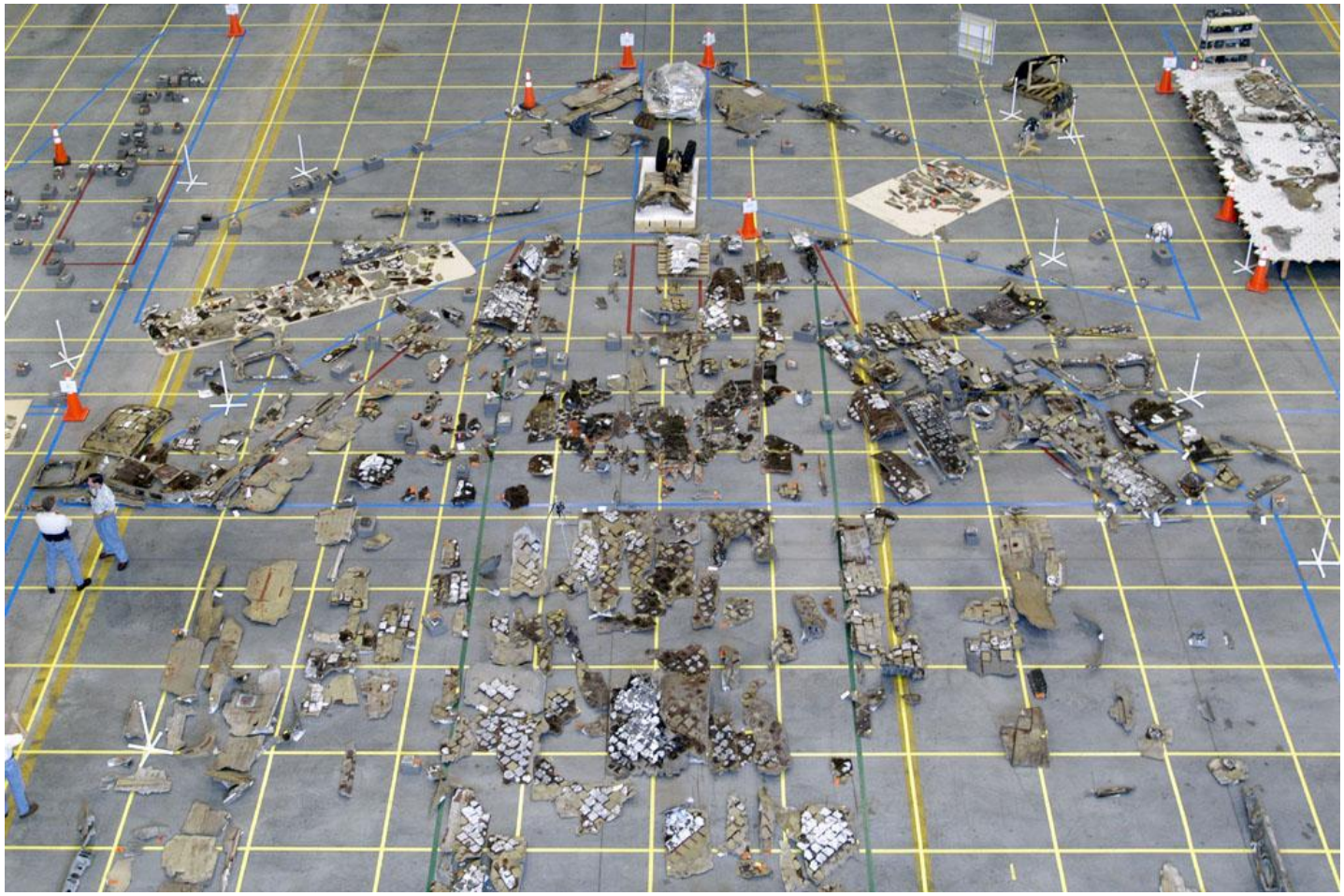
STS 107 Breakup
Infrared Camera Images

Images captured by a Danish aircrew in an AH-64 Apache helicopter near Fort Hood, TX

STS 107 Breakup



View of Reconstruction Grid 6/4/03



Debris Recovery Facts

- Furthest west recovered debris - Littlefield Texas.
- Over 30,000 people, over 1.5 million person-hours.
- 37+ helicopters, 7+ fixed-wing aircraft.
- 700,000 acres searched on foot, 1,600,000 acres searched from air. Equivalent to 1.25 mi. wide track from Seattle to Boston.
- 83,800 debris pieces recovered, 83,013 found to be from Columbia.
- 84,900 lbs recovered, or 39% of calculated vehicle dry weight at entry interface.
- At peak, 75 engineers and technicians worked two shifts, six days per week, expending more than 144,000 person-hours in the reconstruction hangar alone.
- 2,800 pieces placed on debris grid at KSC.
- Debris shipments ran from 2/15/03 through 5/6/03.
- This was the largest such search ever carried out in the U.S. and probably the world.

Introduction of Dr. Stepaniak

- Now Dr. Stepaniak will provide an overview of the medical response and Search & Rescue.